

that the Commission should not mandate a common air interface for PCS.

83. The growing body of economic literature on compatibility standards does not provide a basis for government imposition of standards for CMRS air interfaces, or for continuation of the AMPS requirement for cellular carriers. The theoretical literature finds that, depending on factors that are difficult or impossible to measure, the market may either tend to stay with an obsolete standard when it may be socially desirable to change standards ("excess inertia" in the literature) or tend to switch to a new standard when it may be socially desirable to stay with an established standard ("excess momentum") (Farrell and Saloner, "Standardization, Compatibility, and Innovation", 16 *Rand J.* 70, 1985; Katz and Shapiro, "Network Externalities, Competition, and Compatibility", 75 *Amer. Econ. Rev.* 424, 1985; Tirole, *The Theory of Industrial Organization*, 1988, at 404-09). This literature provides little basis for government mandates because it does not enable one in practice to distinguish between situations in which the market produces an efficient standard without government intervention, in which it would be desirable for government to adopt a new standard (to overcome excess inertia), or in which it would be desirable for the government to intervene to maintain an old standard (to overcome excess momentum).
84. Moreover, the economic literature recognizes that institutions often develop to minimize any potential externality. For example, when decision makers (e.g., CMRS providers) can communicate and jointly decide on a standard, then the externality disappears (Farrell and Saloner at 73; Liebowitz and Margolis, "The Fable of the Keys," 33 *J. Law and Econ.* 1, 1990, at 3-4). There are many examples of voluntary private industry standards organizations, such as the Society of Automotive Engineers (SAE) and the Institute of Electrical and Electronic Engineers (IEEE), that appear to be quite successful in facilitating industry-wide consensus on technical standards. Since

CMRS providers can communicate on such issues, there is no reason to believe that an externality will exist.

85. Consider an analogy from the early history of the automobile industry. As that industry developed, engineers and designers had to make a series of decisions about standards for tires, fuel, and other items provided by third parties to consumers who purchased automobiles. Each automobile company had the same range of incentives and trade-offs described above with respect to the adoption of new technologies and product designs. Sometimes, adoption of a new technology, such as engine improvements, made new automobiles incompatible with old accessory products, such as motor oils. A government requirement that each manufacturer had to maintain interconnectability with all of its various suppliers or competitors would clearly have frustrated the development of the automobile, perhaps freezing technology for many years. The absence of government interconnection standards does not seem to have hindered the development of both engines and motor oils. While it is easy to see why some firms might benefit from such government intervention, it is very hard to see how consumers could benefit.
86. The literature that suggests that sellers may not have an adequate incentive to take into consideration the value of compatibility to consumers generally relates to situations in which consumers buy long-lived durable goods (Farrell and Saloner, 1985; Katz and Shapiro, 1985). These models suggest that some sellers do not have an adequate incentive to produce goods that are compatible with the outstanding inventory owned by other parties. This literature is of little relevance to CMRS, for two reasons. *First*, a substantial portion of CMRS subscribers have relatively short-term contracts. *Second*, to the extent that CMRS providers also provide customers with equipment, the result is that suppliers internalize the costs of their own decisions about technology. Therefore CMRS providers have incentives to consider the benefits and costs of their choices.

87. The empirical literature on standards is sparse. Although there is literature arguing that some market-established standards are inefficient (e.g., David argues that the QWERTY keyboard is inefficient), others have concluded that market-established standards are efficient (e.g., Liebowitz and Margolis find that the QWERTY keyboard is just as efficient as the allegedly superior Dvorak keyboard) (David, "Clio and the Economics of QWERTY," 75 *Amer. Econ. Rev.* 332, 1985; Liebowitz and Margolis at 1). Of the thousands of voluntary or market established standards, few (if any) have been proven to be inefficient. For example, Liebowitz and Margolis state:

The empirical support for the market failure of standards is extremely weak. Typewriter keyboards and video recorders served for a time as the demonstration of existence of the market failure as long as analysis remained at the level of casual empiricism. More detailed analysis is destructive to these claims as our [earlier] papers demonstrate. To date, we are not aware of any evidence of a single demonstration of a case in which a superior standard failed to dominate a market. (Liebowitz and Margolis, "Market Processes and the Selection of Standards," unpublished, 1995.)

Therefore, the empirical economic literature does not provide any significant evidence that the government should mandate a common air interface for CMRS.

88. There are inherent costs in mandating a standard, even if there is reason to suppose that the market will not produce the most efficient standard in a timely manner. *First*, because it does not have all relevant information on technology, costs, and demand, the government may simply mandate the wrong standard, one that is inferior not only to the optimal standard, but also inferior to the standard (or lack of standard) that would develop in the market.
89. *Second*, a government-enforced standard may reduce the incentive to develop a superior alternative (Gilbert, "Symposium on Compatibility: Incentives and Market Structure," 40 *J. Ind. Econ.* 1, 1992, at 2). Moreover, if a superior alternative is developed, a government-

mandated standard can impede its adoption. Just as competition among firms selling a service leads to lower prices and costs—which benefit consumers—competition among standards leads to new and better standards. For example, competition between the Beta and VHS video formats led to longer-playing and better-quality videos for consumers (Liebowitz and Margolis, 1995).

90. There are currently four potential common air interface standards for CMRS: (1) AMPS; (2) Time Division Multiple Access (TDMA), which is now embodied in standards IS-54 and IS-136; (3) Code Division Multiple Access (CDMA), which is now embodied in standard IS-95; and (4) Global System for Mobile Communications (GSM), the European digital cellular standard. The government has mandated use of the AMPS standard for analog cellular service. The other three standards are digital. Cellular and SMR systems are now converting to digital technology, and PCS systems are likely to use digital technology. However, there is no consensus on the optimal rate of conversion from analog to digital cellular. The government requires that cellular systems continue to offer service to their analog customers even if the systems partially convert to digital. Also, there is no consensus on which digital standard is likely to be the best or whether the optimal configuration would involve different digital standards for different uses. Technology is rapidly changing, and it is possible that some other standard will ultimately prevail as the most common air interface for CMRS communications.
91. Each one of these technologies has advantages and disadvantages, and no one technology currently dominates the others across all performance and cost dimensions. Analog technology has a number of disadvantages compared to digital technology, such as inferior voice quality, a higher frequency of signal drops, and greater use of spectrum per call. The main advantage of analog technology is that it is used by the current installed base of cellular phones and cellular station equipment. Among digital alternatives, TDMA has the advantage of being able to use existing cellular channels; therefore, it

is more "backwards" compatible than CDMA and GSM. GSM has the advantage that it is currently in use in Europe and in many Middle Eastern countries; therefore, U.S. cellular users could use a GSM phone in these other countries. CDMA holds out the hope for more efficient use of spectrum than TDMA and GSM, but is not clear how great this advantage will be.

92. When there are competing standards, the market is particularly well suited for determining which system is best. Consumers will tend to buy service from CMRS providers that use the technology with the best combination of cost and service quality.
93. The market also has the ability to lower the costs of having more than one interface technology by offering dual (or multiple) use customer equipment. For example, cellular services offering TDMA digital air interfaces offer customers a dual use phone that is compatible with the AMPS analog interface, giving customers the ability to use analog roaming services when they travel out of the digital home service area (*Communications Daily*, February 23, 1994; *TelecomWorld-Wire*, April 13, 1994). Similarly, Ericsson will produce a phone that will interface with both cellular systems and with PCS systems. As markets expand and as technology improves, the cost of producing such dual (or multiple) use phones will likely decline.
94. Some may claim that mandating a common air interface may be important because different cellular companies are adopting different interfaces for digital systems. But the diversity of interface choices provides a clear indication that the business and technical personnel of the CMRS providers have not reached a consensus about which interface is superior. Because the technology is rapidly evolving and there is not yet a consensus, it is likely that government action to arrive at a standard interface now would result in an inefficient interface. The market is likely to discover the most desirable interface, and it is likely that CMRS systems will adopt the desirable interface once it is known. The CMRS providers themselves have strong

incentives to facilitate agreement on any standard that is efficient once there is enough information to determine which is efficient because the demand for their services will be enhanced when one is adopted.

95. The Commission has asked for comments on the costs and benefits of retaining its mandatory cellular analog AMPS interface standard (*Id.* at ¶59). The Commission should rescind the requirement that cellular providers maintain analog service. The justification for this requirement would have to be that, absent government control, the market would exhibit “excess momentum,” that is, cellular systems would rush to convert to digital technology and drop analog service more rapidly than would be socially desirable. But there is no evidence that this would occur. It appears just as likely that there would be “excess inertia,” in which case it would be better for the Commission to mandate a new standard (if we knew which new standard was best). Given the situation, it appears desirable for the Commission to rescind its analog requirement so that the market can provide a transition to a new common interface as soon as it is able to do so.

C. Subscriber Database Access

96. The Commission has asked for comments on the access to proprietary subscriber databases necessary to provide seamless roaming across CMRS service areas (*Second NPRM* at ¶59). It is not clear that seamless roaming is efficient in all situations (see ¶¶59-60, *supra*). The issue is whether the market can be expected to bring about the type of roaming—whether this is seamless or not—that is efficient. In theory, there could be an externality that would prevent the market from achieving roaming with a sufficient degree of seamlessness. However, as in the case of air interfaces to support roaming, it is unlikely that an important externality exists or that, if it does, voluntary industry organizations could not overcome the unilateral insufficiency of incentive. It does not appear that there is an exter-

nality problem because the value consumers place on seamlessness will be reflected in the prices that CMRS providers can charge and the profits that they make.

97. Moreover, CMRS providers have voluntarily established a standard for providing the subscriber information necessary for seamless roaming. The IS-41 standard provides access to Home Location Register and Visitor Location Register databases over the Signaling System #7 network. While the government mandates provision of roaming service to end-users, roaming service can be provided without access to databases maintained by the roamer's home system because the roamer can pay for roaming services by entering a credit card number.

IX. RESALE OBLIGATIONS: INTERCONNECTION AND UNBUNDLING

A. Rationale for Resale Obligations

98. The Commission has tentatively concluded that the existing obligation of cellular providers to permit resale of their services should be extended to all CMRS providers (*Second NPRM* at ¶83). The *Second NPRM* does not address the premise that the existing resale obligation of cellular providers should be continued. The Commission's principal rationale for cellular resale obligations is that cellular carriers would have an anti-competitive incentive to deny resale, first, in order to practice price discrimination; second, in order to monopolize the retail marketing and distribution of cellular services; and third, in order to delay the entry of CMRS competitors whose entry would be facilitated by the ability initially to resell cellular services (*Id.* at ¶¶63, 84, 88). Further, the Commission argues that "even though carriers are permitted to charge and realize a profit from selling services to resellers, the return is higher when they provide the retail service directly to end users. Thus, absent a Commission-imposed resale obligation, it is our tentative view that

carriers might very well refuse to permit other providers to resell their service" (*Id.* at 86).³

99. There are serious problems with each of the Commission's rationales for imposing resale obligations on cellular carriers. *First*, the ability of a cellular provider to practice anti-competitive price discrimination⁴ is limited by competition from the other cellular provider, other CMRS providers such as SMR and paging service providers, and the landline system. Even if there was a basis for concern about price discrimination by cellular carriers in the past, the introduction of additional competition from PCS and ESMR providers would soon eliminate that basis for concern.
100. *Second*, there are no grounds for believing that a resale obligation is necessary to prevent cellular carriers from leveraging market power from the wholesale to the retail level. There is no persuasive evidence that cellular carriers have been in a position to exercise market power in the past (see my earlier declarations cited in ¶1, *supra*). In any case, the introduction of additional competition from PCS and ESMR providers will soon eliminate even the potential for such market power. Even if they had market power, cellular providers would have strong incentives to have retail distribution and mar-

³ Gillan and Rohrbach argue that the single LEC bottleneck may be replaced by multiple bottlenecks controlled by a number of suppliers of local exchange services, including perhaps CMRS providers, each of which would be in a position to exercise market power. Gillan and Rohrbach propose imposition of resale obligations. Their analysis, which is inconsistent with economic reasoning, makes no sense, as Brenner and Woodbury explain. Gillan and Rohrbach, "The Potential Impact of Local Competition on Telecommunications Market Structure: Diversity or Reconciliation," mimeo, March 1994, and Brenner and Woodbury, "Local Telecommunications: Competition and Bottlenecks—A Response to Gillan and Rohrbach," Charles River Associates, August 1994.

⁴ Not all price discrimination is anticompetitive. In some circumstances price discrimination enhances efficiency.

keting performed in the least-cost manner, regardless of whether this involves independent resellers, independent agents, vertical integration of cellular carriers into retail distribution, or a combination of these. Even a monopolist must minimize costs in order to maximize profits. Minimization of costs contributes to profits both directly and by enabling the firm to reduce prices and increase sales.

101. *Third*, the argument that early entrants into an industry should be required to facilitate the entry of subsequent competitors cannot be accepted as a general public policy. While there may be benefits from having additional competitors, a general obligation to facilitate entry by competitors would involve a high cost to society. It would reduce the rewards to innovation and to taking the risk of being an early entrant by permitting free riding. In light of the fact that cellular carriers do not control essential facilities, one cannot appeal to the essential facilities doctrine to support a resale obligation for cellular providers. Even in the extreme case of an essential facility, it is not always good public policy to mandate access to competitors, because doing so may deny the owner of the essential facility rewards that provide a socially useful incentive to invest, innovate, and take risks. Indeed, patent policy takes the opposite approach. Patent protection is designed to limit free riding for a period of time in order to increase the rewards to innovation, even though this restricts competition that might otherwise exist.
102. The Commission is also correct in concluding that imposition on CMRS providers of obligations to permit facilities-based competitors to resell may delay investments by the latter in their own networks (*Id.* at ¶90). Resale obligations inevitably carry with them regulation of prices charged to resellers, quite possibly at artificially low prices. If a facilities-based carrier is able to obtain services from another carrier at an artificially low price, this will reduce its incentive to produce such services for itself.

103. The costs identified in the two preceding paragraphs imply that the Commission should reconsider its requirement that cellular providers be required to offer services to facilities-based competitors for resale for a period of five years. In light of its costs, this requirement should probably be eliminated, or at least its duration should be shortened.
104. If the Commission limits or eliminates obligations imposed on a CMRS provider to offer services for resale by facilities-based "competitors," the Commission should define "competitors" for this purpose to include at least all participants in the relevant antitrust markets in which the CMRS provider in question competes. It would be reasonable to include at least all CMRS providers whose service territories overlap significantly with the first provider's territory, because the relevant antitrust market in which each CMRS provider competes may include all these CMRS providers. Moreover, it is possible for two suppliers (Able and Baker) to be in the same antitrust market even if they do not provide direct substitutes, because Able and Baker may each offer services that are close substitutes for services offered by a third supplier, Charlie, which is unable to price discriminate. In this situation, Able may constrain the prices of Charlie, and Charlie may constrain the prices of Baker, so that Able constrains the prices of Baker. In this situation, Able and Baker are effectively competitors (see ¶51, *supra*).
105. *Fourth*, there is an important flaw in the Commission's argument that CMRS providers have an inefficient incentive to deny resale because the CMRS providers earn a higher return when they provide retail service directly to end users. Suppose CMRS carriers have no obligation to provide services to resellers and that prices to resellers are not regulated. In that case, if CMRS providers find it more profitable to sell directly to end users than to sell to resellers, the implication is that direct sale to end users is more efficient—that is, resellers cannot offer retail distribution services as efficiently as CMRS providers can supply them. In this case, retail distribution

costs will be increased by imposition of an obligation to provide services to resellers and by regulation of prices at which sales to resellers are made. If, on the other hand, there is regulation of prices charged to resellers, and if this regulation inefficiently makes it more profitable for CMRS providers to sell directly to retail customers even though resellers could handle retail distribution more efficiently, then the appropriate regulatory response is to eliminate the regulation of prices charged to resellers. It does not make sense to impose inefficient regulation of prices charged to resellers and then to try to offset the incentives created by these inefficient prices by regulating the behavior of CMRS providers.

106. In conclusion, the Commission has not offered a rationale for continuing to impose on cellular providers an obligation to provide their services to resellers nor for regulating the prices charged to resellers, whether through requirements that such prices be "reasonable" or "not unduly discriminatory" or otherwise.

B. Interconnection with Reseller Switches and Unbundling

107. The Commission has correctly concluded that it should not require facilities-based cellular providers to permit cellular resellers to install their own switching equipment and to purchase unbundled services. The Commission bases its conclusion correctly on the finding that "Given the number of competitors we expect to be present in [the relevant] market in the near future, competitive forces should provide a significant check on inefficient or anticompetitive behavior....Moreover, a mandatory switch-based resale policy may impose costs on the Commission, the industry, and consumers. For example, CMRS providers might have to incur costs to satisfy a requirement to unbundle their services and offer interconnection on the terms needed for switch-based resellers.... Further, we are concerned about the administrative complexity and costs of imposing such regulations" (*Id.* at ¶¶95-96).

108. The Commission has tentatively concluded that the relevant antitrust product market to be used in evaluating market power for purposes of evaluating proposals regarding reseller switch obligations “comprises those wireless carriers that offer switched mobile voice services over networks that are fully interconnected to the public switched telephone network” (PSTN). The Commission concluded this was the relevant market “because the product that resellers appear to want to provide is mobile voice telecommunication services” (*Id.* at ¶95).
109. The Commission’s argument that the relevant market is limited to the services that resellers want to provide is incorrect. The fact that resellers want to provide a particular set of services does not imply that that set of services is something that could be profitably monopolized. The Commission’s reasoning ignores two reasons that the relevant product market may be broader than the specific services that interest resellers. *First*, consumers may have close substitutes for mobile voice services over networks that are fully interconnected with the PSTN, for example, mobile voice services that are not fully interconnected with the PSTN (if any), mobile data services, pay telephone services, and other landline services. *Second*, it ignores the fact that CMRS providers that are supplying non-voice services may be in a position to provide voice services if the price of voice services increases. Thus, the relevant product market should be defined to include at least all CMRS providers, and it could include landline services as well.
110. The California Public Utilities Commission (CPUC) has argued that in order to stimulate competition in cellular service the Commission should enable resellers to install their own switches and to purchase unbundled services from facilities-based carriers (*Second NPRM* at ¶79). I have addressed the CPUC’s arguments at length in another

Commission proceeding See Declaration of Bruce M. Owen on the California Petition, GN Docket No. 93-252, Sept. 19, 1994, ¶¶94-101.

111. The Commission has noted that two cellular resellers have filed complaints concerning refusals by cellular licensees to permit interconnection with resellers' switches (*Id.* at ¶97). The existence of complaints by resellers who favor obligations on the part of facilities-based CMRS providers to offer switch-based interconnections to resellers and to unbundle the services provided to resellers is not evidence of anti-competitive behavior, as much antitrust law and commentary makes clear (Areeda and Hovenkamp, *Antitrust Law*, 1993 Supplement, 1993, at 808-14; Owen and Braeutigam, *supra* ¶1, chap. 1). When a wholesale supplier, such as a facilities-based cellular provider, uses a dual distribution system in which it offers service both through company-owned retail outlets and through independent resellers, complaints by the independent resellers are common. Switch-based interconnection or unbundling may be denied because it would be inefficient, and a complaint may be nothing more than an effort to obtain service at an artificially low price.

X. CONCLUSION

112. Based on my economic analysis and my review of the empirical evidence, it is my opinion that the Commission's proposed raising rivals' costs theory does not identify a significant threat to competition. The Commission has previously found that the CMRS industry is, or is likely to be, sufficiently competitive as to need no state or federal rate regulation. The Commission's conclusion that the market is sufficiently competitive to justify forbearance from regulation of cellular and other CMRS carriers is correct. Having reached this conclusion, the Commission has no basis for the interventions considered in the *Second NPRM*. In the absence of market power concerns, there is no basis for interconnection requirements,

roaming requirements, mandatory compatibility standards, or resale obligations. Decisions on interconnection and bundling are best left to the market rather than being subjected to regulation. There is no persuasive evidence that obligations to provide interconnections, other than those that result from market forces, would have significant benefits, but such obligations are likely to have substantial costs. Interconnection obligations, as well as other types of regulation such as mandatory roaming and unbundling of services sold to CMRS resellers, would therefore be likely to harm consumers. Neither cellular systems nor other CMRS providers control essential facilities. Regardless of concentration levels, there is no sound basis for a conclusion that CMRS providers have been exercising significant market power. There is evidence of competition, and concentration will fall substantially over the next several years. In any case, a CMRS provider that wishes to allege that denial of a direct interconnection is anticompetitive has available to it the option of seeking redress from the antitrust enforcement authorities or suing for an injunction and treble damages under the antitrust laws.

113. In sum, there is no conceptual or empirical basis for believing that there is a problem with market performance that would warrant

regulating CMRS decisions regarding interconnection, roaming, standards, or resale. Overall, I conclude that conditions warrant continued forbearance from regulation.

I declare under penalty of perjury that the foregoing is true and correct.

A handwritten signature in black ink, consisting of a large, stylized 'B' followed by a sharp peak and a horizontal line extending to the right.

Bruce M. Owen

June 14, 1995

ECONOMISTS INCORPORATED

CURRICULUM VITÆ

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RECENT PROFESSIONAL
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